Name:

at1124exam: Radicals and Squares (v925)

Question 1

Simplify the radical expressions.

$\sqrt{27}$ $\sqrt{98}$ $\sqrt{44}$

$\sqrt{3 \cdot 3 \cdot 3}$ $\sqrt{7 \cdot 7 \cdot 2}$ $\sqrt{2 \cdot 2 \cdot 11}$

$3\sqrt{3}$ $7\sqrt{2}$ $2\sqrt{11}$

Question 2

Find all solutions to the equation below:

$$2\left((x-4)^2+9\right) \;=\; 90$$

First, divide both sides by 2.

$$(x-4)^2+9=45$$

Then, subtract 9 from both sides.

$$(x-4)^2=36$$

Undo the squaring. Remember the plus-minus symbol.

$$x-4=\pm 6$$

Add 4 to both sides.

$$x=4\pm 6$$

So the two solutions are $x=10$ and $x=-2$.

Question 3

By completing the square, find both solutions to the given equation. *You must show work for full credit!*

$$x^2 + 10x = -9$$

$$x^2 + 10x + 25 = -9 + 25$$
$$x^2 + 10x + 25 = 16$$
$$(x+5)^2 = 16$$
$$x + 5 = \pm 4$$
$$x = -5 \pm 4$$
$$x = -1 \quad \text{or} \quad x = -9$$

Question 4

Any quadratic function, with vertex at (h, k), can be expressed in vertex form:

$$y = a(x-h)^2 + k$$

A quadratic function is shown below in standard form.

$$y = 5x^2 + 40x + 71$$

Express the function in **vertex form** and identify the **location** of the vertex.

From the first two terms, factor out 5 .

$$y = 5(x^2 + 8x) + 71$$

We want a perfect square. Halve 8 and square the result to get 16 . Add and subtract that value inside the parentheses.

$$y = 5(x^2 + 8x + 16 - 16) + 71$$

Factor the perfect-square trinomial.

$$y = 5((x+4)^2 - 16) + 71$$

Distribute the 5.

$$y = 5(x+4)^2 - 80 + 71$$

Combine the constants to get **vertex form**:

$$y = 5(x+4)^2 - 9$$

The vertex is at point $(-4, -9)$.